

# Service Manual





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## IMPORTANT THINGS TO KNOW ABOUT THE MR-61 AND MR-76


**About this Manual:** The information in this manual is for both the MR-61 and the MR-76 keyboards. Both keyboards are virtually identical, and the few differences between them will be specifically addressed. Otherwise, all information in this document pertains to both products.


As with every ENSONIQ product, all MR-61 and MR-76 keyboard service is handled through the ENSONIQ Module Exchange Program. Rather than diagnose and exchange individual components, you will replace complete modules. We feel that this is the most time and cost effective method of repair, both for you and your customers.


### SAFETY FIRST!

Safety instructions are prioritized in the following manner:

-  **Warnings (To safeguard people).** Whenever there is the possibility that a person may harm themselves following instructions or procedures, you will see a warning.
-  **Cautions (To safeguard your equipment and the equipment you are repairing).** Whenever there is a possibility of damage to your test equipment, you will see a caution.

 **Warning - Be careful! Do not receive an electrical shock!** Make sure the MR-61 and MR-76 power supply cord is unplugged before disassembling or reassembling the MR-61 and MR-76 or opening the case for any reason!

 **Caution -** Make sure the MR-61 and MR-76 power switch is off before plugging in the power supply cord.

 **Warning -** The MR-61 and MR-76 are designed with aluminum and steel parts. **There are very sharp edges inside the MR-61 and MR-76. Be careful not to cut yourself when working on an MR-61 and MR-76.**

## **AN IMPORTANT NOTE ABOUT ELECTRO STATIC DISCHARGE**

Many of the internal components in the MR-61 and MR-76 and areas of their expansion boards are susceptible to Electro Static Discharge (ESD), commonly known as “static.” Electro static discharge can damage or destroy electronic devices. Here are some procedures you can follow when handling electronic devices in order to minimize the possibility of causing ESD damage:

- Before opening the MR-61 or MR-76, or handling the expansion boards, you should be grounded. Use a ground strap to discharge any static electric charge built up on your body. The ground strap attaches to your wrist and any unpainted metal surface within the MR-61 or MR-76.
- Avoid any unnecessary movement, such as scuffing your feet when handling electronic devices, since most movement can generate additional charges of static electricity.
- Minimize the handling of the expansion boards. Keep them in their static-free packages until needed. Transport or store the expansion boards only in their protective packages.
- When handling the expansion boards, avoid touching the connector pins. Try to handle the expansion boards by the edges only.

## **OTHER AREAS OF CONCERN**

### **New Lid Design**

The design of the hinged lid for the MR-61 was improved after the first initial run (about 1,000 units). Older MR-61 units had both hinges in the same direction, so without the internal retaining cable, it was possible that the lid could fall off the unit when opened. This newer lid design puts the hinges in opposite directions and prevents the lid from falling off when the unit is open. Therefore, the new hinged lid design does not require the retaining cable. If you are servicing an older hinged-lid MR-61, verify that the retaining cable is attached and secure. The hinge fix is irrelevant for the MR-76.

### **Socketed vs. Unsocketed Chips**

The first 3,000 mainboards were designed with unsocketed chips. Socketed chips allow you to easily change the chips when necessary. If you are working on a unit that has unsocketed chips and a change is available, replace the entire mainboard.

### **Pan Potentiometer Knob**

When turning an MR-61 or MR-76 upside down for servicing (such as when removing screws from the bottom), a disproportionate amount of weight is pressed against the pan potentiometer knob. It's best to place two books (1" thick) beneath each end of the unit to avoid this condition. The pan potentiometers used in early units were more likely to break due to this uneven weight distribution. If you have a unit with a broken pan potentiometer, you can either replace the right keypad/display board or just replace the pan potentiometer. To order a new pan potentiometer (P/N #1070001101), call the ENSONIQ Customer Service Department.

## THE DISK DRIVE

### TRANSPORTING A UNIT

We do not, under any circumstances, recommend the insertion of an actual disk during transport. Only transport the unit with the drive empty. **Please do not ship an MR-61, MR-76, or a replacement disk drive in a box packed with foam peanuts.** If you must use foam peanuts, wrap the entire unit in plastic first. Foam peanuts may cause severe damage to the disk drive or keyboard.

### WHAT DISKS TO USE

The MR-61 and MR-76 have a built-in quad-density disk drive, allowing MR-61 and MR-76 sounds, presets, rhythms, sequences and songs to be stored onto high-density (HD) or double-density (DD) 3.5" floppy disks. The MR-61 and MR-76 writes information to every track on a disk, so it is imperative that the disk be of superior quality.

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**Note:** The MR-61 and MR-76 will only format high-density disks. When formatting a DD floppy for use with the MR-61 or MR-76, it's best to use the following DOS command to ensure that it will work successfully with the MR-61 or MR-76: "format (alphanumeric character designation of your floppy drive): /F:720".

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### TESTING THE DISK DRIVE

The best way to test the disk drive is by formatting a high density (HD) disk. When a disk is formatted, the MR-61 and MR-76 reads and writes every track on that disk. If the formatting fails, the disk itself may be faulty. Try formatting another disk before determining that the disk drive is faulty. Unlike some computer systems, the MR does not automatically discard bad sectors when formatting. The entire disk must be good for successful formatting. There is an exception, a disk that has been pre-formatted for MS DOS can be used in an MR-61 and MR-76, but it may not work reliably in the unit.

#### To Format a Floppy

1. Insert a non-copy-protected, high density 3.5" floppy disk into the disk drive, with the label-side facing up, and the metal shutter facing away from you. Make sure the plastic write-protect tab is in the closed position (no light showing through the window).
2. Press Utilities.
3. Turn the Parameter knob counterclockwise until the display shows "Format floppy disk?".
4. Press the flashing green Enter button two times.  
The disk is now formatting. When it's finished, the display returns to the "Format floppy disk?" screen.

## **SAVING FILES TO FLOPPY DISK**

Before doing any work on a customer's unit, we recommend saving an All-SESSION file to a formatted floppy disk (if possible). This type of file contains all of the sounds, presets, rhythms, and songs currently stored in FLASH and RAM. When the unit is repaired, you can load in the saved all-session file, reinstalling all of the customer's original data.

### **To Save an ALL-SESSION File**

1. Insert a formatted floppy disk into the drive.
2. Press Save.
3. Turn the Parameter knob counterclockwise until the display shows "Save to disk? ALL-SESSION:SESSION."
4. At this point, you can name the file by spelling on the keyboard as if it were a typewriter-the character associated with each key is printed above the key on the MR's front panel. The C# and D# keys in each octave move the cursor forward and back on the display (the character currently selected for editing is underlined). The G# types a blank space.

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**Tip:** If you name the all-session file with the first eight letters of the customer's last name, it will be easy to identify the data/disk at a later date.

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5. Press the flashing green Enter button.  
The session is now being saved to floppy disk. When finished, remove the floppy disk from the drive and store in a safe place.



**Caution** - When saving data to a floppy disk, don't remove the disk from the drive until the disk drive light is no longer flashing-doing so may result in corrupted data on the disk and/or in the MR's internal memory.

### **To Load an ALL-SESSION File**

1. Insert the floppy disk that contains the ALL-SESSION file you'd like to load into the MR's disk drive.
2. Press the Disk/Global Load button.
3. Turn the Parameter knob until the display shows "Load from disk? ALL-SESSION:<name>." This should be the name of the file saved earlier. If not, press the arrow buttons until the correct file name is displayed.
4. Press the flashing green Enter button.  
The session is now being loaded into the MR-61 or MR-76. When finished, remove the floppy disk from the drive and save for future use.



**Caution** - When loading data from a floppy disk, don't remove the disk from the drive until the disk drive light is no longer flashing-doing so may result in corrupted data on the disk and/or in the MR's internal memory.



## UPDATING THE MR-61 AND MR-76 OPERATING SYSTEM (O.S.) VERSION

With most electronic devices, operating system (O.S.) upgrades have become common. For ENSONIQ products, an operating system upgrade provides system enhancements, and at times offers additional features. The MR-61 and MR-76 O.S. is contained entirely on a pair of chips - a ROM chip and an EPROM chip - installed in sockets on the MR's mainboard. Any O.S. changes require changing the O.S. EPROM chip. If an O.S. change is necessary, update kits are available for you to order from ENSONIQ Customer Service. Always check the MR-61 or MR-76 to make sure it has the current O.S.

You can find out what the current operating system is by calling ENSONIQ Customer Service at (610) 647-3930, or calling the ENSONIQ Fax Retrieval System at (800) 257-1439. The Fax Retrieval System offers over 200 documents covering all of the ENSONIQ products, as well as a variety of related issues. We suggest requesting the complete catalog of available documents. Document 0010 is the current O.S. list.

## USING THE EPROM KIT

Items included in the EPROM replacement kit:

- One software update EPROM chip
- A self-addressed stamped envelope
- An anti-static wrist strap



**Caution - Do not remove the EPROM chips from the protective black foam until you are ready to install them.** Be sure to use a grounding strap when handling the chip to avoid damage from static discharge.

A disposable grounding wrist strap is included in this kit. You don't need to use the wrist strap until you have the MR-61 or MR-76 open. A grounding wrist strap will discharge to ground any static built up on your body, and prevent you from damaging your software chip or your MR-61 or MR-76.



**Warning -** Make sure the power switch is off any time the case of the MR-61 or 76 is opened, and always use a grounding wrist strap.

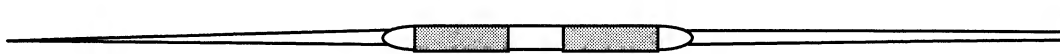


**Caution - MR-61 and MR-76 Case (Avoid Stripping Screws):**

Take care when assembling or disassembling any part of the MR-61 and MR-76. Avoid over tightening screws when repairing a unit! Use no more than 8 in./lb. of torque when tightening any screw. When replacing any of the screws, it is possible to over-tighten the screws and strip out a hole.

Tools Needed:

- #2 Phillips screwdriver
- A thin bladed, flathead screwdriver or a scribe (see figure 1):



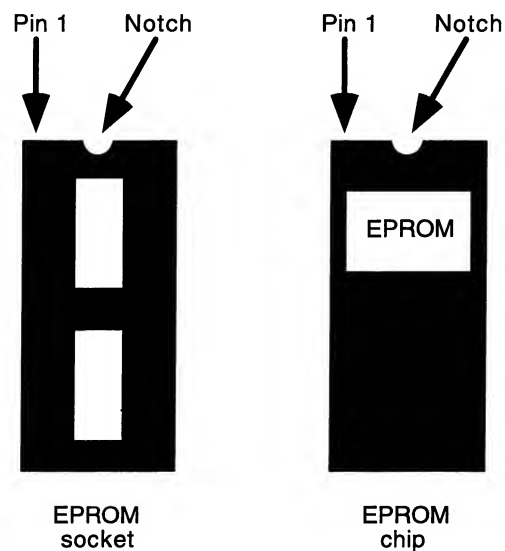
**Figure 1 - Scribe**

Scribes are found in the following catalogs:

- Techni-Tool catalog, part number 400PR144.
- Newark catalog, part number 76-1510.

**ALIGNING THE EPROM CHIP TO THE SOCKET**

The MR O.S. EPROMs must always be justified to pin 1 on the chip and the socket. The EPROM chip and its socket have a notch on one end. Looking down on the EPROM or socket, with the notch facing away from you, pin 1 will always be to the left. Pin 1 of the EPROM will always go into pin 1 of the socket, as shown in figure 2:

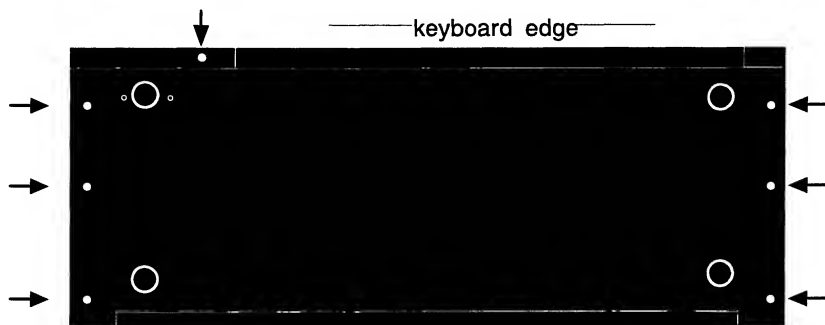


**Figure 2 - EPROM Pin Alignment**

The MR O.S. EPROM chip must always be justified to pin 1 on the chip and the socket.

**Procedure:**

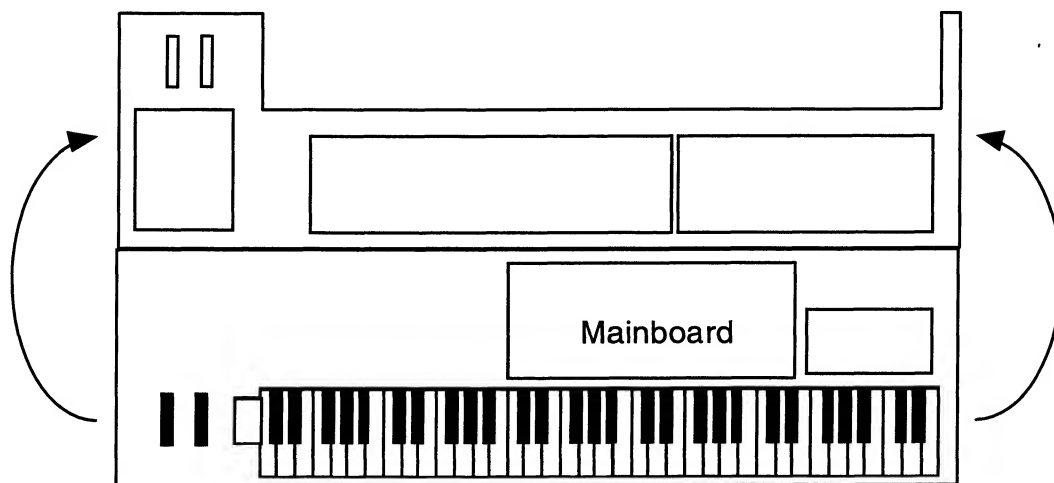
1. Save all data to disk (see **Saving Files to Floppy Disk** earlier in this manual).
2. Disconnect all cables from the MR-61 or MR-76, including the power cable.
3. For the MR-61, remove 7 screws from the bottom of the unit (see figure 3). For the MR-76, skip to step 6):

**Figure 3 - MR-61 Screw Locations**

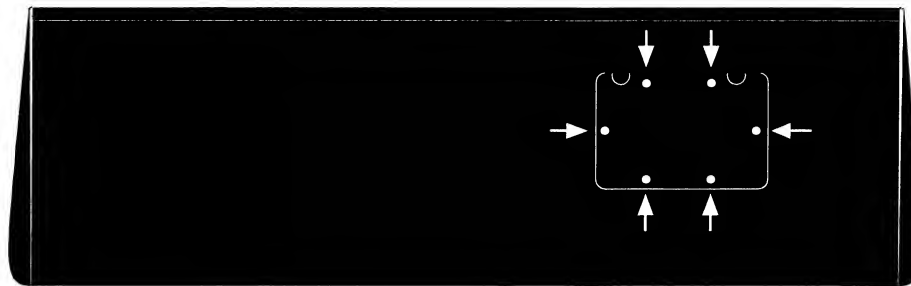
4. With both hands solidly gripping the unit, carefully turn the MR-61 right-side up, and grasp it firmly at the locations shown in figure 4:

**Figure 4 - MR-61 Opening Locations**


5. The top and bottom of the MR-61 are hinged and open like a book. With the unit sitting on a tabletop, lift the top assembly:

**Figure 5 - MR-61 Opening the Lid**

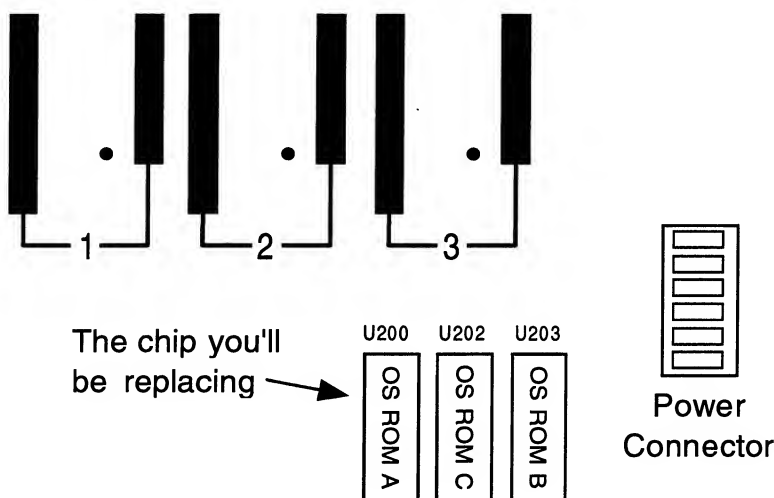
6. With the MR-76, you will need to remove the access cover from the bottom of the unit. Remove the 6 screws and remove the access cover from the bottom of the unit (figure 6).



**Figure 6 - MR-76 Screw Locations**

 **Caution** - From this point on, you should be wearing a grounding wrist strap. Attach the wrist strap to any non-painted metal area of the MR's case (in the MR-76, you can use the inside of its bottom panel).

7. Locate the U200 O.S. EPROM chip on the mainboard (figure 7):



**Figure 7 - EPROM Location**

8. Remove the U200 O.S. EPROM from the MR-61 or MR-76 mainboard. We recommend using the angled end of a scribe (see figure 1), or a thin-bladed, flathead screwdriver to slowly lift each end of the EPROM until it is free from the socket. Gently wedge the scribe or screwdriver between the black socket and the chip (not the green board and the socket), and work it slowly up and down between the chip and the socket, raising the chip a little at one end and then the other, until the chip is free.
9. Lift the chip out of the MR-61 or MR-76 and set it aside for now.
10. Replace the U200 EPROM chip with the new one supplied. Remember to line up the notch in the socket with the notch in the chip. On a new EPROM, it's not uncommon for the left and right sets of pins on a chip to be spread a bit wider than the socket. You can very carefully bend the pins inward slightly by resting the long edge of the chip on a flat non-metal surface and tipping the chip while applying pressure gently.
11. Lower the lid on the MR-61, but do not put the screws in.

12. After replacing the EPROM, the MR-61 or MR-76 should be reinitialized.

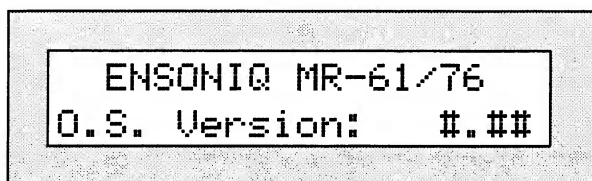
#### **TO REINITIALIZE:**

- a) Press and hold down the Erase button in the Song Editor.
- b) While holding down Erase, turn the MR-61 or MR-76 on.

13. Check the O.S. version.

#### **TO CHECK THE O.S. VERSION:**

- a) Press and hold down the SoundFinder Save button.
- b) While holding down the Save button, press the System button.
- c) The display briefly shows you the version number (###) of the operating system installed in your MR-61 or MR-76.



- 14. If the display doesn't show the correct version, call ENSONIQ Customer Service.
- 15. Turn the unit off.
- 16. On the MR-76, install the access cover. For both the MR-61 and the MR-76, replace all of the screws.
- 17. Load in any work you saved in step 1.
- 18. Give any software information that may be included with the EPROMs to the customer.
- 19. Place the old chip in the black foam and pink bag. Put the pink bag in the supplied envelope, and mail the envelope to ENSONIQ.

#### **HIGH RETENTION FORCE CONNECTORS**

Inside the MR-61 and MR-76 is a warning/information label just for you. We wanted to let you know that we use high retention force connectors in the MR-61 and MR-76. This means it is very difficult to remove a connector by just pulling. We recommend using a scribe, screwdriver, or similar object when disconnecting cables. **Please don't pull on the wires!**



**Caution - We have found that some units develop further problems once a module has been replaced.** This may be the result of improper handling of cables. We recommend removing cable connectors using the angled end of a scribe.

## HOW THE MR-61 AND MR-76 WORKS

The MR-61 and MR-76 is a very powerful computer based on the processing power of the ENSONIQ OTTO chip. There are 6 PCBs inside the MR-61 and MR-76. There is a power supply board, mainboard, a left keypad/display board, a right keypad board, a wheels/pressure board, and a jack/analog board.

- The power supply board is a switching power supply made by Skynet Electronic.
- The mainboard houses 2 OTTO chips, the ESP2 effects processor chip, the microprocessor, the operating system EPROMs, and the system RAM and ROM.
- The left and right keypad/display boards have the display LEDs, LCD, 3 encoder knobs, and system switches.
- The wheels/pressure board is an interface for the mainboard to track key pressure events, and pitch and mod wheel movement.
- The jack/analog board has the MIDI jacks, two foot switch and CV Pedal jacks, and all of the output circuitry on it.

Figure 8 is a block diagram that shows the MR-61 and MR-76 modules and how they are connected:

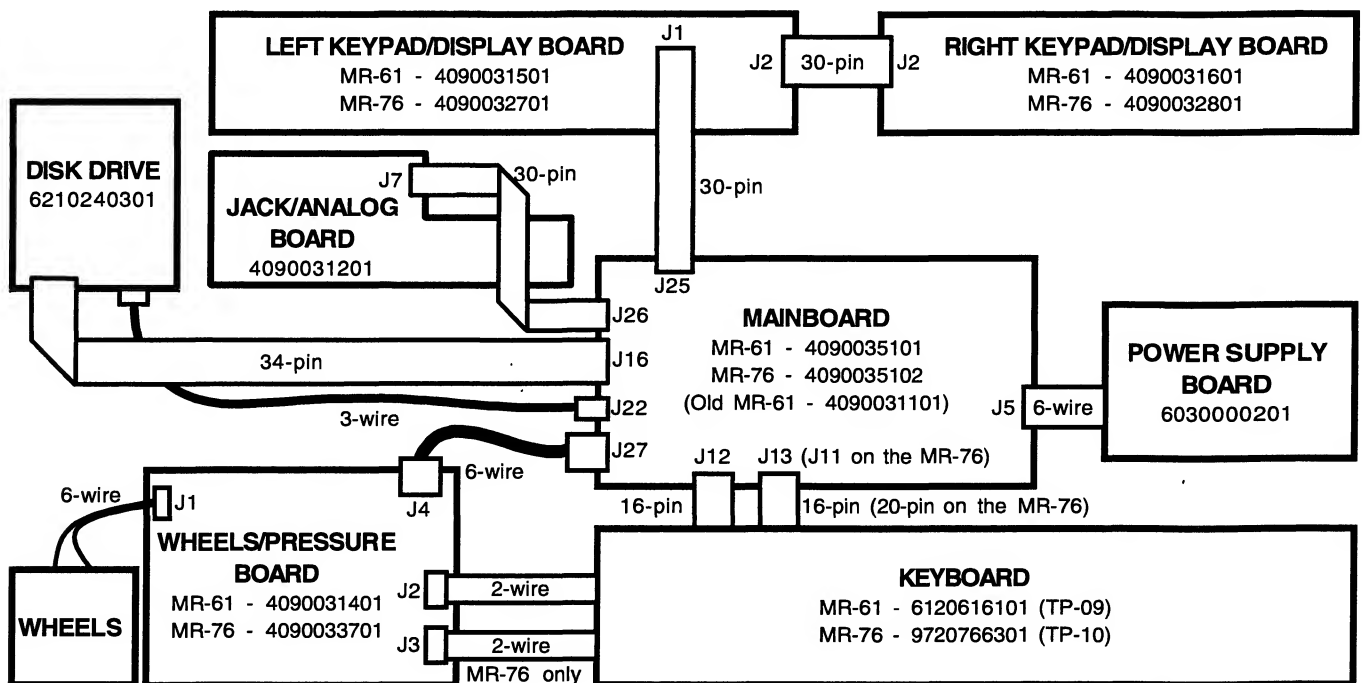


Figure 8 - MR-61 and MR-76 Modules

## **SOFTWARE INFORMATION**

### **ERROR MESSAGES**

Occasional unexpected event messages are not unusual, and unless they become chronic, they are not a cause for concern. It is important to realize that these messages are diagnostic in nature and do not necessarily indicate a problem. These messages were designed to help our software engineers in the development of the software, not as hardware diagnostics.

It is possible that chronic unexpected event messages could be caused by scrambled memory. Be sure to reinitialize the system before troubleshooting any further.

### **TO REINITIALIZE:**

#### **To Perform a Soft Restart**

1. Back up all data to floppy disk (see **Saving Files to Floppy Disk** earlier in this manual).
2. Press and hold down the SoundFinder Save button.
3. While still holding down Save, press the Exit/No button.

If performing a soft restart doesn't end the strange occurrences, you may need to perform a hard reinitialization.

#### **To Perform a Hard Reinitialization**

1. Back up all data to floppy disk (see **Saving Files to Floppy Disk** earlier in this manual).
2. Turn the unit off.
3. Press and hold down the Song Editor Erase button.
4. While still holding down Erase, turn on the MR-61 or MR-76 and allow it to power up fully before letting go of Erase.

## SYSTEM ERROR CODES

System error codes are displayed as “Sorry, An Unexpected Event #XX Has Occurred” messages, where XX is the number of the unexpected event. As stated earlier, these messages are not necessarily diagnostic in nature, and are usually intermittent, or caused by some data error. If the error codes are chronic and cannot be resolved by reinitializing the system, then a mainboard replacement may be necessary. This is especially true for errors 12-255. They are spurious hardware errors.

These are the error codes you might see, and their definitions according to the Motorola MC68340 users manual.

Error Code	Definition
2	Bus Error
3	Address Error
4	Illegal Instruction
5	Zero Division
6	CHK, CHK2 Instructions
7	TRAPcc, TRAPV Instructions
8	Privilege Violation
9	Trace
10	Line 1010 Emulator
11	Line 1111 Emulator
12	Hardware Breakpoint
13	(Reserved for Coprocessor Protocol Violation)
14	Format Error
15	Uninitialized Interrupt
24	Spurious Interrupt
25	Level 1 Interrupt Autovector
26	Level 2 Interrupt Autovector
27	Level 3 Interrupt Autovector
28	Level 4 Interrupt Autovector
29	Level 5 Interrupt Autovector
30	Level 6 Interrupt Autovector
31	Level 7 Interrupt Autovector
32-47	Trap Instruction Vectors
48-58	(Reserved for Coprocessor)
64	User-defined Vector
65	Stack Overflow
66-255	User-defined Vectors



## SOFTWARE RELEASE NOTES

Call the ENSONIQ Fax Retrieval System at 1-800-257-1439 and order document number 0010 for information on current operating system versions or check on our website at <http://www.ensoniq.com/mid/0010.htm>. Outside of the US, call 1-610-408-0741. You can also call ENSONIQ Customer Service for information concerning O.S. versions. Refer to the back cover of this manual for contact numbers.

### **For specific information about items fixed prior to software version 1.64, contact ENSONIQ Customer Service. The following items have been fixed in software version 1.64:**

- Recording a drum kit on Tracks 10 and 11 in Replace mode (loop on) resulted in data appearing on track 16.
- When recording in Replace mode, previously recorded notes were not replaced. Intermittent.
- Sending a drum rhythm into the sequencer did not follow time signature rule. If you sent a 4/4 drum rhythm into a 6/8 sequence that contained data, the sequence was converted to 4/4 time.
- Record Mode indicator LED's showed the wrong state after recording a new track after going into Add mode on a previous track.
- Erasing Track 10 in a sequence had a problem where the track LEDs stayed on and some rhythm remained in Track 10. Attempting to erase it again shows 'track is already empty.'
- After recording on Track 1 and then Track 10 (Rhythm Track) is selected, the sound incorrectly changes to "Std. Kit-GM."
- The second and subsequent times you play a Playlist from its beginning, the first and second beats run together-the first time, they do not.
- Erasing a rhythm track will not entirely work (i.e., an unknown rhythm will play back) after a sequence not containing a rhythm is copied, a rhythm is sent to the copied sequence, the sequence is copied back to the existing one, the rhythm track erased in that sequence, and a Playlist is created.
- Entering Add record from a point before Region From, when From is active, causes the sequence to append itself to itself at the From point.
- Punching in with Loop=On in Add record mode at a point just before the sequence loops causes the countoff to play.
- The unit will lock up after a one track sequence (A) is copied to an empty sequence (B), is copied back, therefore replacing the original sequence (A), a second track is recorded (in A), saved to disk as a Song, reloaded after a reboot, and the sequence erased. Note: after re-loading, the second track recorded in A disappears.
- After a track has been recorded & Play is pressed, changing the sound on that track, and then pressing Enter to confirm the new sound, will correctly stop the sequencer, but will display the original sound instead of the new one. Keyboard correctly plays the new sound.
- It's possible to record in Add mode while the Replace mode LED is lit.
- Demos can appear to be broken (pressing ENTER in response to "Start demo playback?" causes nothing to play) if MIDI ClockSource=MIDI. The problem would persist even after the unit is power-cycled, since ClockSource is stored in Flash.
- Recording in Add mode with From on and pressing Record and Play from a point before the region, copies a portion of the sequence onto itself. Note data from the point where you pressed Record and Play is copied to the From point.
- If, after assigning a sound to a track in any way (by entering record on an undefined track, by assigning a sound through TrackFinder, or by sending from SoundFinder or the Idea Pad), immediately selecting track 10 and entering record puts Std GM kit on track 10. If you then copy track 10 to another track, the destination track has GM piano.
- If a track has been copied in Replace mode, and the sequence has a rhythm on Track 10, erasing the rhythm and then copying another track in Replace mode causes Track 10's red LED to light. Entering record on Track 10 shows the original rhythm as the sound name, though the rhythm can't be heard during recording. After recording, playing back the sequence plays the rhythm using the wrong rhythm kit.
- With data on any defined track, erasing the entire track and then immediately re-entering record causes the unit to play the sound that was on that track before erasure, instead of the current SoundFinder sound.
- When you press Stop in the Drum Machine to cease recording Vars and Fills in the 16 Track Recorder, the unit will not play the Vars and Fills when you initially hit Play. You must either Press Play, Stop, and Play again, or press Rewind at some point to hear them. Furthermore, if the sequence runs to the end and is not looped, pressing Play causes the Vars and Fills to disappear again.
- Rhythm tracks that are erased entirely reassign the last selected rhythm when you press Send to Track in SoundFinder and then play those rhythms on whatever sound you send over to Track 10.
- A song can be constructed and saved to disk in such a way that it can become corrupted. In this state, it will reload consistently without its playlist. If Play is pressed after loading such a file, nothing happens. If Locate is used (holding

Stop and moving the Parameter knob) to go to another bar location in Seq A, the display will show 43691.03.256. If there is another song in memory and Select Song is pressed, and the corrupted file is selected, the MR will freeze and must be rebooted.

- A file will become corrupt - i.e., the display will read “Bad MIDI file data! File can’t be loaded.” after a track has had its Expression value edited via Track Mix record mode, a Playlist is created, the Song is saved to disk, reloaded, copied to another part, the pan values edited via Track mix, a new Playlist is created, saved to disk, and reloaded.
- A file can become corrupt (i.e., the display will read “Bad MIDI file data! File can’t be loaded.”) when modifying the playlist and overwriting the original file. The following is done: a one track sequence is created (A), is made into a Playlist (AA), is saved as a SONG to disk (1-SONG: SONG0001), is reloaded, the sequence (A) is copied (B), a new Playlist is created (AB), is saved as a SONG to disk (1-SONG: SONG0001 -- overwriting the original), the above parenthetical repeated (exactly the same way), and the file is loaded for the last fatal time. Note: this means that the file SONG0001 was overwritten 3 times.
- Overwriting a seq/song file with a smaller seq/song file fails to truncate the ‘left-over’ data, resulting in a corrupted file.
- Loading in files that had been corrupted due to overwriting large files with smaller ones can cause crashes or lockups. Intermittent.

## **TROUBLESHOOTING**

Often the faulty module in an MR-61 and MR-76 can be determined through normal use. Sometimes it is difficult to isolate the problem. When troubleshooting an MR-61 or MR-76, be sure no devices are connected to the MIDI ports unless you are testing MIDI. It is also important to be sure that unit is plugged into a properly grounded outlet.

You should always follow this sequence when troubleshooting an MR-61 or MR-76:

1. Reinitialize the unit.
2. Check the operating system version.
3. Check the power supply voltages.
4. Run system tests.

Following this sequence will often save you and your customer’s time.

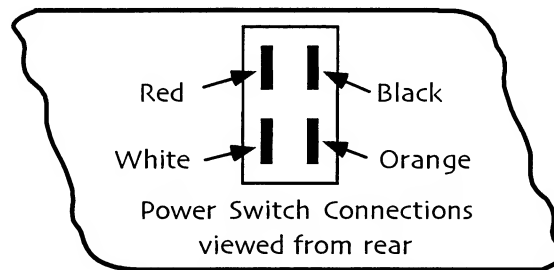
Remember to always follow safety precautions to safeguard yourself, your test equipment, and the unit you are repairing.

The following pages include troubleshooting and repair information.

## THE POWER SUPPLY

### HOW THE MR-61 AND MR-76 GETS POWER

The AC input to the MR-61 and MR-76 is routed directly to the rear panel power switch. All three AC input wires are wrapped around a ferrite bead before being connected anywhere inside the unit. The Earth ground connection (green wire) is made directly to the chassis. The live and neutral (red and black) wires are connected to the top two blades of the power switch, as shown in figure 9:



**Figure 9 - Power Switch Connections**

When the power switch is turned on, the AC current is routed to the power supply board by orange and white wires that are connected to the bottom two blades of the power switch. The power supply board is a 40-watt switching power supply made by Skynet Electronics (model #6030000201). It supplies positive 5 volts and positive and negative 15 volts DC output to the mainboard via a 6-pin connector.

### FUSE

There is one IEC 55F 250V 2.0A fast blow fuse on the power supply PCB.

## POWER SUPPLY VOLTAGE CHECK POINTS

All power supply voltages can be checked without removing the power supply cover.

### AC input:

Read the line voltage at the top two blades of the power switch with the power switch off. If the line voltage is incorrect there, make sure the AC supply cord is good, and that all connections at the AC input jack are good.

Read the line voltage at the bottom two blades of the power switch with the power switch on. If the voltage was good at the top two blades and is bad at the bottom two blades, replace the power switch.

### DC output:

The test points are as follows:

Voltage	Pins	Tolerance
+5	2 (4 is ground)	+4.90 to +5.10 VDC
+5	3 (4 is ground)	+4.90 to +5.10 VDC
+15	1 (5 is ground)	+14.00 to +16.00 VDC
-15	6 (5 is ground)	-14.00 to +16.00 VDC

1. Measure the power supply DC output at the 6-pin connector J5 on the MR-61 and MR-76 mainboard.
2. If the voltages are not correct, power down the MR-61 and MR-76, disconnect the display board from the mainboard (at connector J25) turn the power back on and measure again. If the voltages are good now, replace the display boards. If the voltages are not correct, move on to step 3.
3. If the voltages are not correct with the display board disconnected, power down the MR-61 and MR-76, disconnect the 6-pin power connector from the mainboard, turn the power back on and measure them unloaded. If the voltages are good unloaded, replace the mainboard. If the voltages are still wrong, replace the power supply board.

## THE MR-76 KEYBOARD

The MR-76 uses the same keyboard as the KS-32, KT-76, and the TS-12. Instead of mechanical switches, this keyboard has a molded, rubber “bubble” under each key. The keyboard circuit board has conductive carbon contacts printed on it (which appear as small black strips under each key). Each rubber bubble also has small conductive carbon dots printed on the inside. The bubbles are made in strips which attach to the circuit board using small nubs. The nubs on a strip are pushed through holes in the circuit board, in order to hold the strip in place.

As a key is pressed, it forces the bubble down until the carbon dots on the bubble hit the carbon contacts on the circuit board. This completes the circuit. The circuit has two contacts per key, a back contact and a front contact. The back contact closes first when a key is pressed, then the front contact closes. The MR-76 measures the amount of time between when the contacts close, which tells how fast the key was hit, making the keyboard “velocity-sensitive.” In other words, the MR-76 can tell how hard the musician is playing and can adjust the volume and brightness of the sound in response to the playing style. Each bubble switch also has a diode in series with it for proper circuit operation.

### KEY RESPONSE PROBLEMS

Although bubble switches are more reliable than mechanical switches, there are still many things that can go wrong with this keyboard. If the bubble switches don’t switch in the proper order, or if the switches don’t make clean contact, several problems can occur. These include:

- Keys that don’t sound at all
- Erratic keys that “chatter” as they are played
- Keys that sound much louder than other keys
- Keys that sound much quieter than other keys

These problems can be caused by several things, including:

- Open or shorted traces on the circuit boards
- Bad or dirty carbon contacts on the circuit boards
- Bad or dirty carbon contacts on the bubbles
- Torn or otherwise damaged bubbles
- Bubble strips that are installed backwards
- Interference between the key and the bubble (such as foreign material trapped between the key and the bubble)
- Improper alignment between the key and the bubble
- Bad diodes

Usually failures will fall into two categories, either one key is bad, or a group of keys is bad. If a group of keys is bad, all the keys may be next to each other ( usually a group of eight), or they may be spread across the keyboard (usually every eighth key).

If keys fail in a group of eight or every eighth key fails, the problem is most likely an open or shorted trace on the circuit board or a problem with the keyboard processor board (that is mounted to the bottom of the keyboard assembly). Check this first and repair as explained on the following two pages.

If only one key is bad (or if groups of keys are bad but not in a group of eight or every eighth key), the problem could be any of the above. The first thing to do is remove the key and see if there is anything obviously wrong with the bubble:

- **Look for damage to the bubble itself.**

If the bubble is damaged, the circuit board must be removed so the strip can be replaced.

- **Check that the bubble strip is seated flat against the circuit board.**

If the strip is improperly seated, use an appropriate tool (a straightened paper clip works well-don't use a sharp tool as it can puncture the rubber strip) to force the nubs on the strip into the holes on the circuit board. The strip should lay flat against the circuit board.

- **Check that the bubble isn't backward. If installed correctly, the deeper of the two bubble contacts should be at the rear of the keyboard.**

If the strip is in backwards, remove the circuit board, pull the strip off the circuit board, turn it around, and reinstall it.

- **Remove any foreign material caught between the bubble and the key.**

- **See if the plunger on the top of the key is making contact with the top of the bubble.**

If the plunger on the key forces the bubble down unevenly (with one side of the bubble being much higher than the other side), loosen the screws that hold the circuit board in place and slide the circuit board over slightly to better align the key and the bubble, then retighten the screws.

- **Check that both diodes for that key are inserted properly (the banded end of all diodes should face the same way).**

If a diode is in backwards, the circuit board must be removed, the diode must be unsoldered, reversed, and re-soldered.

- **Check that both diodes for that key are working properly.**

Select the "diode check" setting on an ohmmeter and test the diodes. The diode should conduct when the negative (black) lead of the ohmmeter is on the cathode(banded) end of the diode and the positive (red) lead of the ohmmeter is on the anode (unbanded) end of the diode. The diode should not conduct when the negative (black) lead of the ohmmeter is on the anode (unbanded) end of the diode and the positive (red) lead of the ohmmeter is on the cathode(banded) end of the diode. If a diode is bad, replace it with a 1N914B diode.

If there is no obvious problem, remove the circuit board:

- **Examine the circuit board for short circuits.**

These are usually caused by solder bridging. Touch up any shorts with a soldering iron and/or a razor knife.

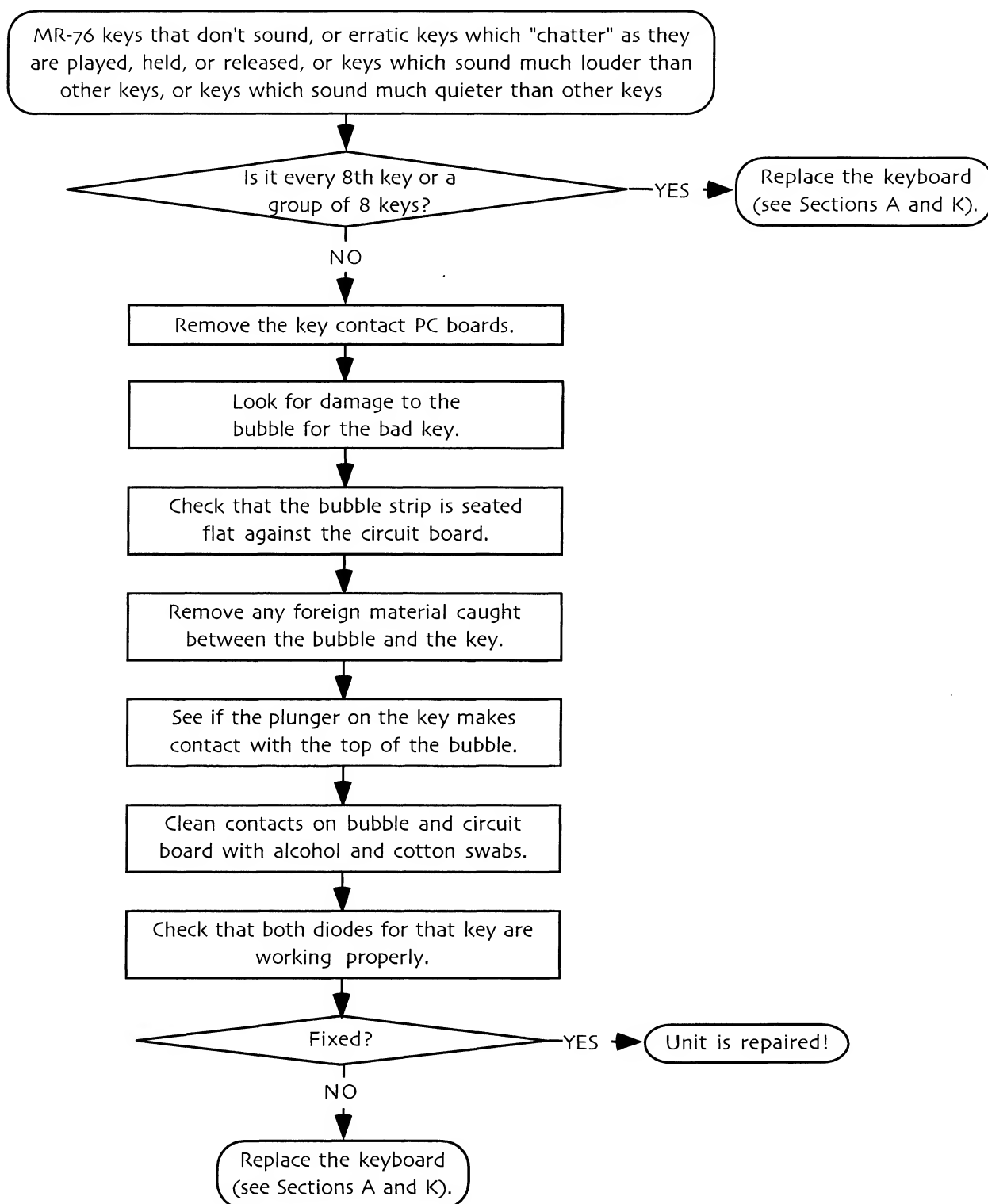
- **Look for open traces.**

These usually occur at the break-away points along the edge of the board and near the connectors. Solder a wire jumper in place to fix any broken connections.

- **Remove the bubble strip and clean both the circuit board contacts and the bubble contacts with alcohol and a cotton swab.**

Allow them to air dry before putting the bubbles back on the circuit board.

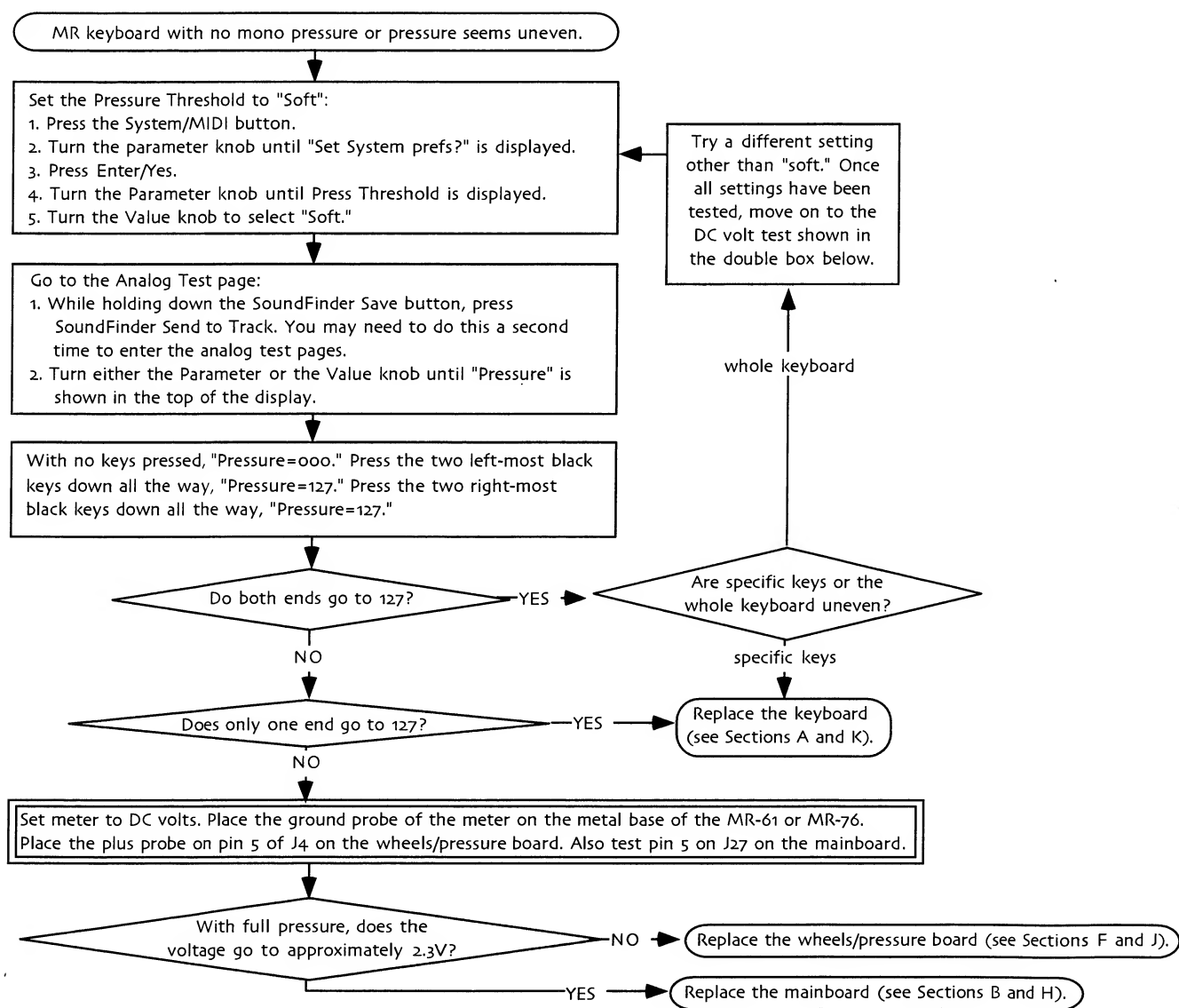
If after all this the keyboard still doesn't work properly, replace the entire keyboard assembly.

**Figure 10 - Troubleshooting MR-76 Key Response Problems**

## PRESSURE RESPONSE PROBLEMS

The MR-61 and MR-76 have mono pressure response. This allows a modulation effect to increase as you press harder on a key. Pressing harder on any key will affect all other keys. To produce mono pressure in the MR-61, there is a single pressure sensitive strip inside the keyboard assembly. Two strips are used in the MR-76, because of its large 76-note span. Pressing on a key exerts a downward pressure on the strip(s). The pressure signals from the strip(s) are sent to the wheels/pressure board mounted near the wheel assembly. Note that it is normal for pressure response to vary depending on the number of keys being pressed.

If pressure response is not working properly, check the alignment of the pressure strip(s), and make sure that they are properly and securely connected to the wheels/pressure board. Replacement of the pressure strip(s) is not practical on this keyboard assembly. If there is damage to the pressure strip(s), replace the entire keyboard assembly.



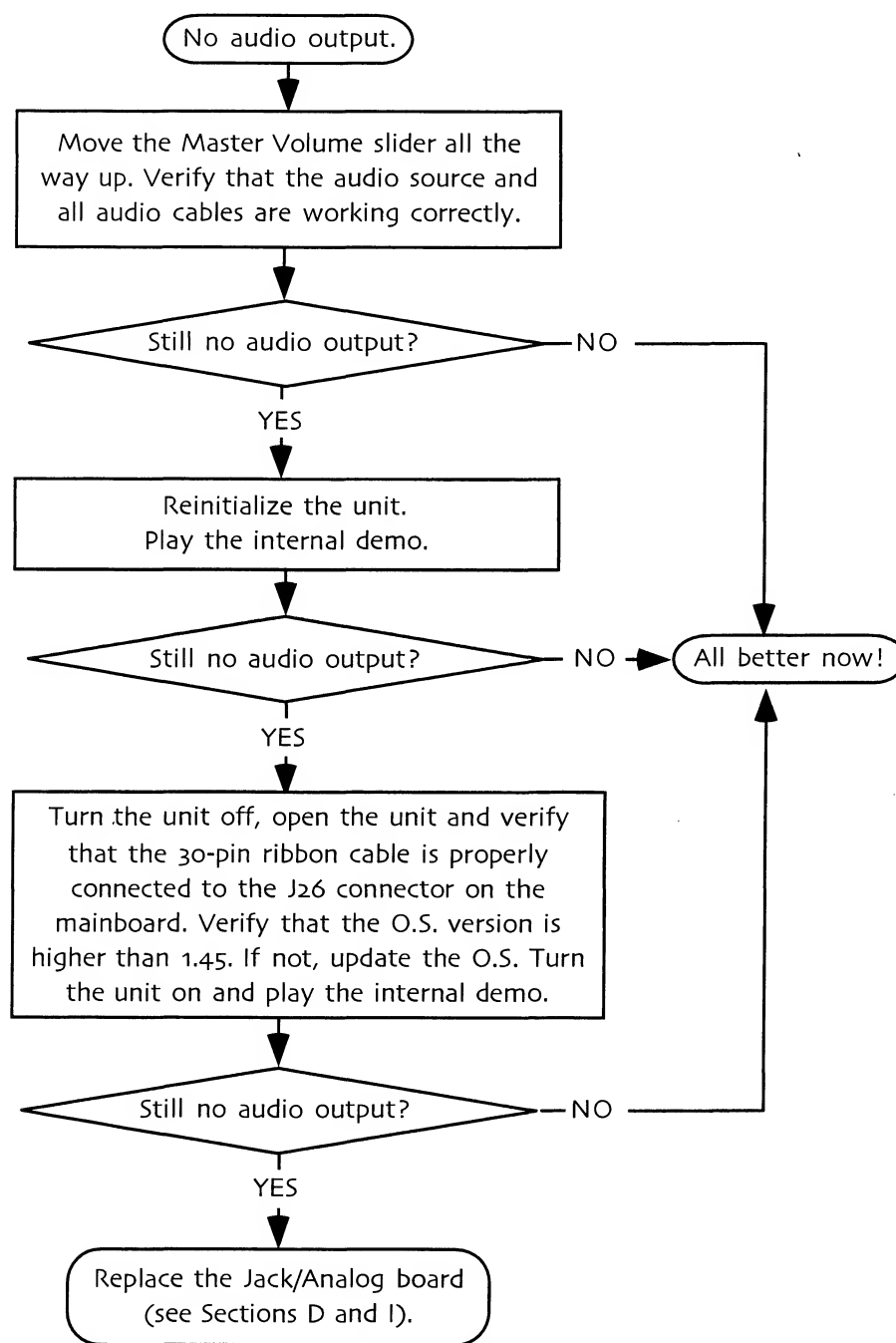
**Figure 11 - Troubleshooting Pressure Response Problems**



## THE JACK/ANALOG BOARD

### NO AUDIO PROBLEMS

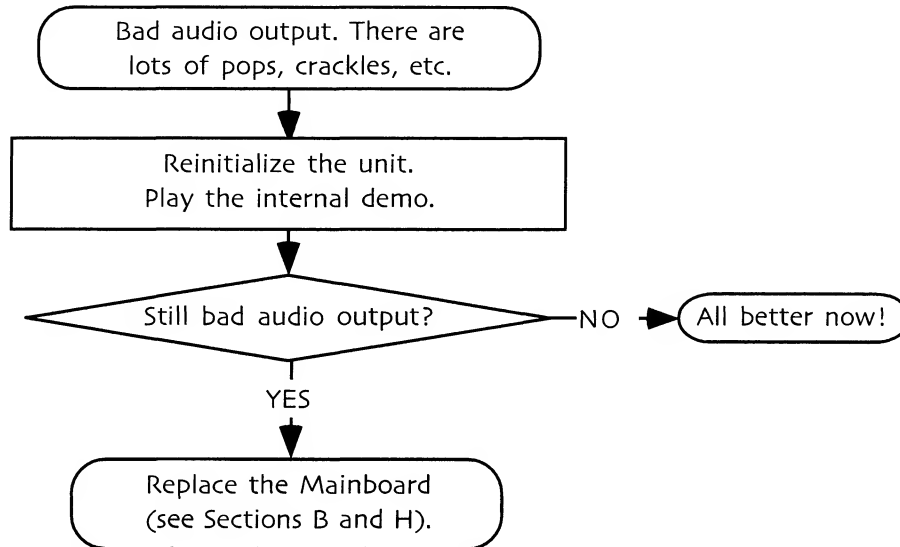
One of the problems that has been encountered with the MR-61 and MR-76 is no audio output. This problem is most common with software versions earlier than 1.45. If you are experiencing a “no audio” problem, please verify the problem using the following flow chart:



**Figure 12 - Troubleshooting No Audio Problems**

## **BAD AUDIO PROBLEMS**

If you are hearing various pops, clicks, crackles, or any other symptoms of bad audio when listening to the MR-61 or MR-76 through headphones or your audio source, it is likely that there is problems with the ESP chip on the main board. To verify if you are having problems due to a defective ESP chip, use the following flow chart:



**Figure 13 - Troubleshooting Bad Audio Problems**

## MR-61 AND MR-76 TEST PROCEDURE

The following tests should help you decide which module inside a MR-61 and MR-76 to replace in case of a failure. Remember that there are only six modules inside the MR-61 and MR-76, and most of the circuitry is located on the mainboard. In most cases, if the power supply checks good, and the unit is malfunctioning, you should reinitialize the MR-61 and MR-76. If the reinitialization doesn't clear the problem, the mainboard is probably defective.



**Caution** - All RAM data will be erased when the MR-61 and MR-76 is powered-up with the test expansion card installed. Save any RAM data before installing the test expansion card. See **Saving Files to Floppy Disk** earlier in this manual for storage instructions.

Equipment needed:

- #2 Phillips screwdriver
- Short ¼" mono to ¼" mono audio cable
- Short ¼" stereo "Y" audio cable (one ¼" stereo to two ¼" stereo ends)
- Short MIDI cable
- ENSONIQ MIDI Bug™, or some other MIDI Thru indicator
- Test expansion card (available from ENSONIQ Customer Service)
- Blank, formatted high-density (HD) floppy diskette
- Headphones
- Audio amplification system
- 1/4 in. to "whatever your audio amplification system accepts" audio cable

### SYSTEM TESTS

1. Disconnect all cables from the MR-61 or MR-76, including the power supply cable.
2. Open the MR-61 or MR-76 as explained in "Updating the MR-61 and MR-76 Operating System (O.S.) Version" found on page 7.
3. Insert the test expansion card into expansion slot #1. If there is an expansion board already in this slot, temporarily remove it. **Remember to return any expansion boards that you remove!**
4. Connect one end of the short mono audio cable to the Aux Left (mono) jack, and the other end to the CV•Pedal jack.
5. Connect the single end of the stereo "Y" audio cable to the Phones jack, and the other two ends to the Foot Switch 1 and 2 jacks.
6. Connect one end of the short MIDI cable to the MR's MIDI Out jack, and the other end to the MIDI In jack.
7. Connect the MIDI Bug (MIDI Thru indicator) to the MR's MIDI Thru jack.
8. Insert a blank, formatted high-density (HD) floppy disk into the MR61 or MR-76 disk drive.
9. Connect the AC power cable to the MR-61 or MR-76 and plug it in to the AC supply.
10. Turn the power switch on.
11. After the MR reinitializes, press and hold the SoundFinder Save button, then press the SoundFinder Edit button.
12. Release both buttons. The display will read "Alert! Test Mode: Hit EXIT to cancel!".
13. Press the Enter/Yes button. Press the Enter/Yes button a second time.

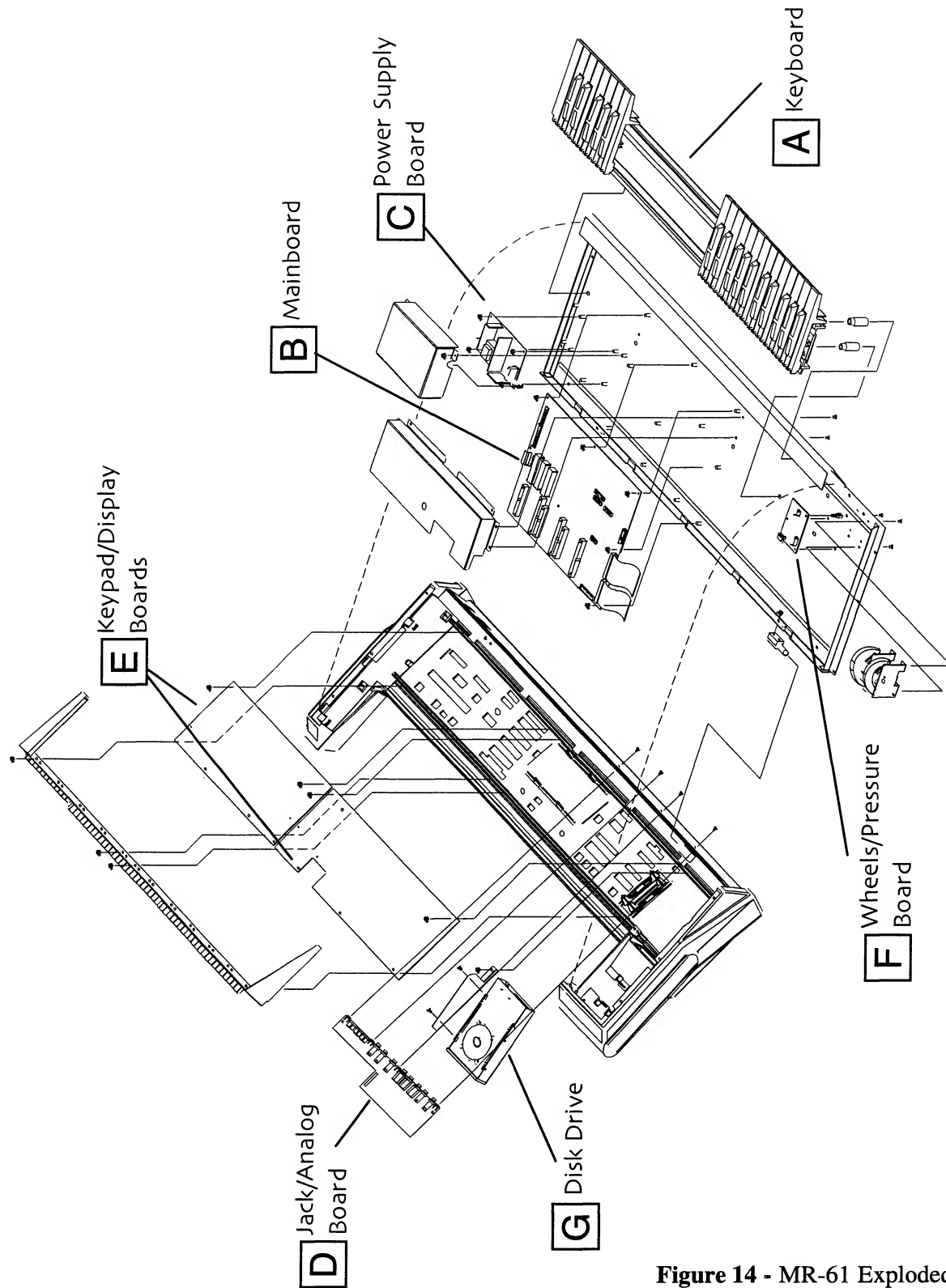
14. The display will prompt you to hit ENTER or EXIT to run the long checksum test. After waiting a few seconds, the MR-61 or MR-76 will begin cycling through its automatic test sequence. Watch the MIDI Thru indicator to see that the MIDI Thru jack is working. The automated test sequence continually runs the following tests:
  - All LEDs on/off
  - Internal waveROM checksum
  - MIDI Loop
  - O.S. RAM
  - ESP2 RAM
  - ESP2 Download
  - Aux-CV pedal Loop
  - Headphone-foot switch Loop
  - Floppy drive (every fourth loop)
  - Internal flash RAM (every eighth loop)
  - Otto 64 Voices
  - Display of test results
15. Let the unit run through 200 or more test cycles. You can check the number of test cycles and the number of test failures by watching the display. After the MR-61 or MR-76 runs the Otto 64 Voice Test, the following values are displayed:  
Tot = ??? (where ??? is the total number of test cycles) ROM=00000 Mid=00000 OS=00000.  
After a short delay, look for RAM=00000 Load=00000 Ped=00000 FtSw=00000, followed by Dsk=00000 Flsh=00000. Then the unit will resume running automated tests.
16. The test failure counters should be all zeros. If there are any test failures, the mainboard is probably defective, with the following exceptions:
  - If the “Mid” (MIDI) test has failed, please check that the MIDI cable is in perfect working condition and re-run the test. If the test continues to fail, replace the mainboard.
  - If the “Dsk” (Disk) test has failed, please check that the diskette in the disk drive is a blank, formatted high-density (HD) floppy diskette. If the test continues to fail, replace the disk drive.
  - If the “Ped” (CV•Pedal) test has failed, please check that the ¼” mono audio cable is in perfect working condition and re-run the test. If the test continues to fail, replace the jack/analog board.
  - If the “FtSw” (Foot Switch 1 and 2) test has failed, please check that the ¼” stereo “Y” cable is in perfect working condition and re-run the test. If the test continues to fail, replace the jack/analog board.
  - If any of the other tests have failed, replace the mainboard.

## **BUTTON TEST**

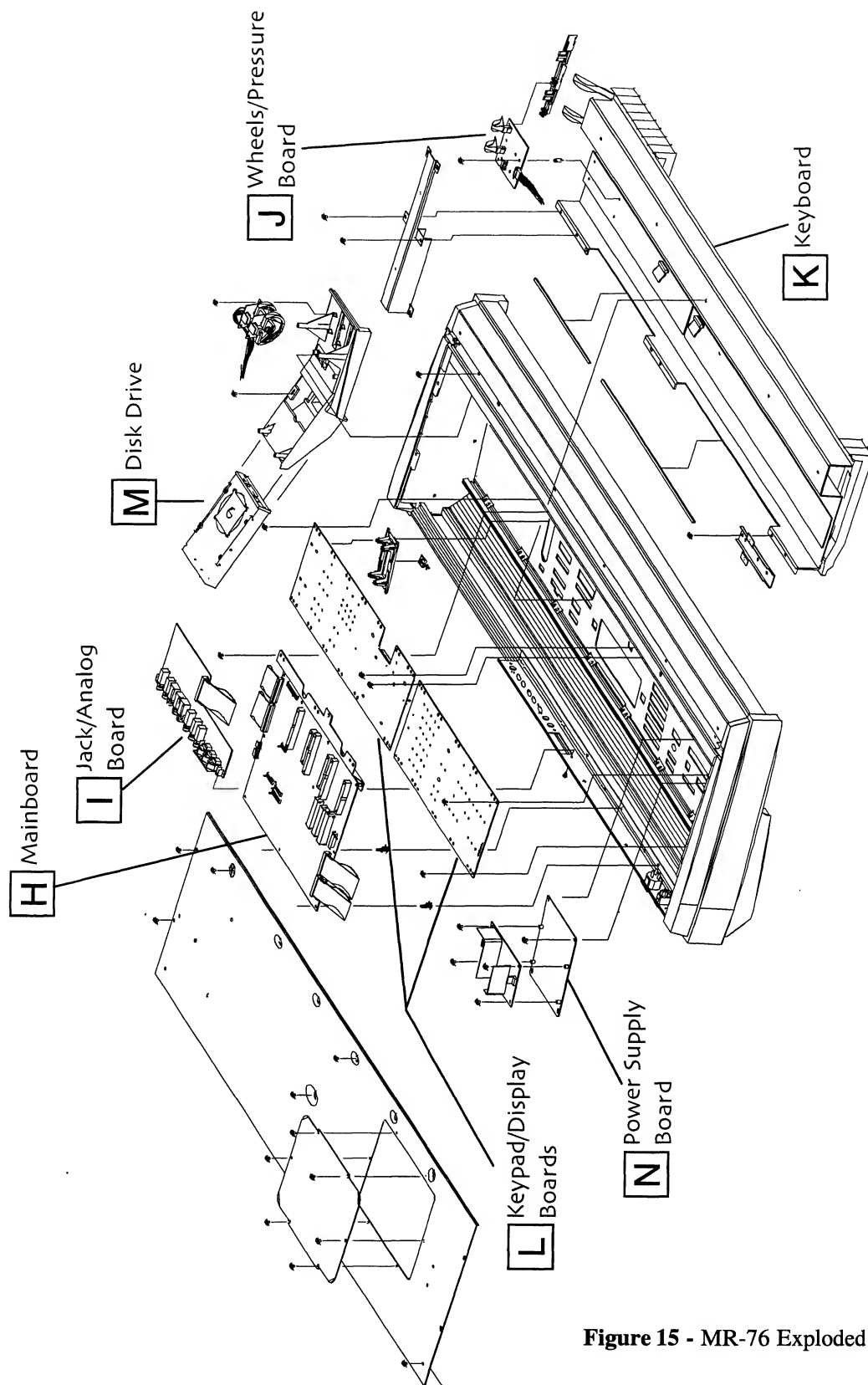
17. Turn the MR-61 or MR-76 off then back on.
18. After the MR reinitializes, press and hold the SoundFinder Save button, then press the SoundFinder Edit button.
19. Release the buttons. The display will read “Alert! Test Mode: Hit EXIT to cancel!”.
20. Press the Enter/Yes button. Turn the Parameter knob until “Keypad Check” is shown in the screen.
21. Press Enter/Yes. The display will tell you to press every button on the front panel. If you wait a moment, it will tell you how many buttons are left to be pressed, and display the next button to press.
22. Press all of the buttons on the front panel. When completed, the display will show “All buttons pressed!”
23. If any of the buttons fail, make sure the button is properly aligned with the switch and that the 30-pin J25 ribbon cable is properly aligned and connected to the mainboard. If the buttons are properly aligned, the proper connections are made, and the test still fails, replace the mainboard.
24. Turn the unit off and remove the test expansion card.

## **AUDIO TESTS**

25. Plug headphones into the headphone jack.
26. Turn the MR-61 or MR-76 on and reinitialize it.
27. Press the upper left Demo button to call-up the MR-61 or MR-76 demo.
28. Press the Enter/Yes button to start the demo playback.
29. Listen through the headphones for sound quality. There should be no crackles pops or hisses. If there is, check to see that the 30-pin J26 ribbon cable is properly secured to the mainboard. If J26 is secured properly, replace the mainboard.
30. Turn the volume control knob all the way up and down and listen to hear that the volume goes all the way up and down. If it does not, replace the jack/analog board.
31. Repeat steps 25 and 26 using your audio amplification system with the main left and right outputs and the aux left and right outputs.



**Figure 14 - MR-61 Exploded View**



**Figure 15 - MR-76 Exploded View**

## REPLACING MR-61 AND MR-76 MODULES

When reading the following sections, refer to the exploded view in figures 14 and 15. Before replacing any modules, it is a good idea to save all data to diskette first, then reload the data after the unit is repaired. See **Saving Files to Floppy Disk** earlier in this manual for storage.

### SECTION

## A

### Replacing the Keyboard (MR-61)

#### Removing:

1. Remove any cables connected to the MR-61 including the power supply cable.
2. Turn the unit upside down on a tabletop. We recommend using a mat or some type of padding to protect the top of the MR-61.
3. Remove the seven (7) screws from the base of the MR-61 as shown in figure 16:

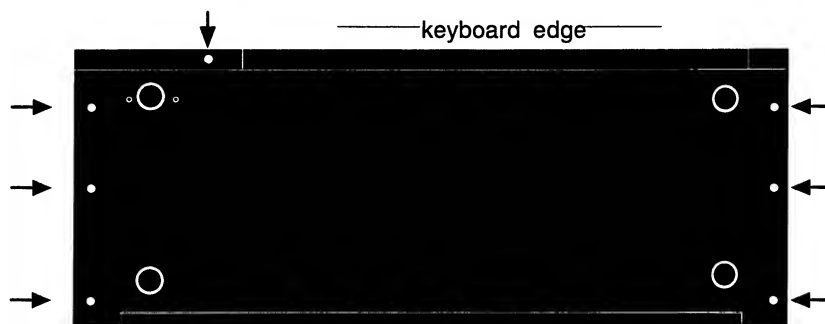


Figure 16 - MR-61 Screw Locations

4. With the unit upside down, remove the eleven (11) screws with washers, as shown in figure 17:

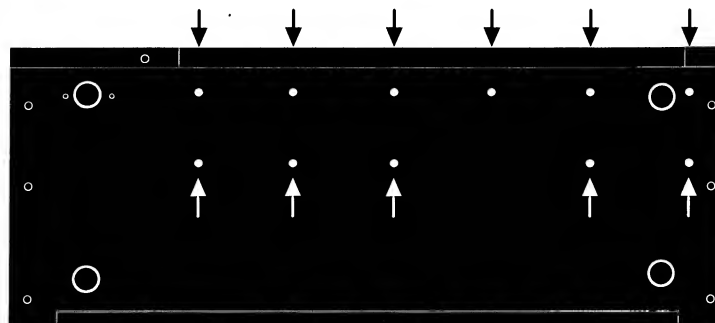


Figure 17 - MR-61 Screw with Washer Locations

5. Holding the base along the keyboard edge, carefully lift the unit a small amount.
6. Disconnect the two 16-pin ribbon cables from the keyboard (J12 and J13 on the mainboard).
7. Disconnect the J2 2-wire cable from the wheels/pressure board.
8. Remove the keyboard assembly (and the plastic spacers) out of the unit.

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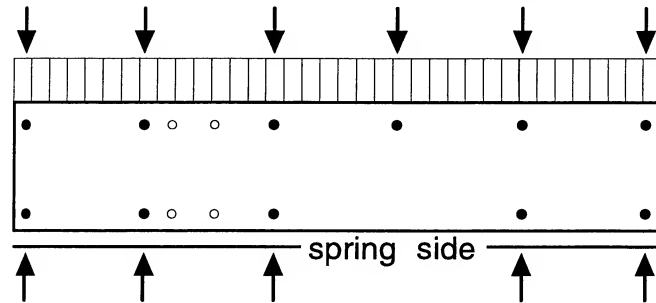
**Note:** The plastic spacers are not attached to the keyboard assembly, they simply rest on the mounting posts. Because of this, it is easier to install and remove the keyboard upside down.

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### Installing:

1. Place the new keyboard assembly upside down on a tabletop on a protective covering, with the spring-side closest to you.
2. Place the spacers on the mounting posts of the new keyboard assembly as shown in figure 18:



**Figure 18 - Spacer Locations**

3. Carefully lower the MR-61 (upside down) into place above the keyboard assembly, and rest the spring edge of the keyboard assembly on the felt strip on the lid.
4. With the base slightly raised, reach in and connect the two 16-pin ribbon cables to the keyboard assembly.
5. Lower the base, and install the eleven (11) screws and washers to secure the keyboard.
6. Carefully turn the unit over.
7. Open the lid, and connect the 2-pin cable to J2 on the wheels/pressure board. Tuck the excess cable beneath the keyboard to get it out of the way of the mod wheel.
8. Turn the MR-61 upside down, and install the seven (7) screws that hold the lid to the base.
9. Turn the unit right side up, and test the unit.
10. Clean the MR-61 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
<b>B</b>

## Replacing the Mainboard (MR-61)

### Removing:

1. Open the MR-61, and remove the keyboard (see Section A).
2. Locate the eight (8) screws that hold the ESD shield in place, turn the unit upside down, and remove the screws.
3. Turn the unit right-side up, and remove the ESD shield.
4. Remove the 6-pin cable from J5, the 30-pin cable from J25, the 30-pin cable from J26, the 34-pin cable from J16, the 3-wire cable from J22, the 6-wire cable from J27, and the two 16-pin cables from J12 and J13.
5. Remove the eleven (11) screws that secure the mainboard to the chassis of the unit.
6. Lift the mainboard out of the unit.

### Installing:

1. Place the new mainboard in the unit and replace the screws removed in step 5 above.
2. Replace the cables removed in step 4 above.
3. Replace the ESD shield using the eight (8) screws removed in Step 2 above. Make sure that the two 16-pin cables at the J12 and J13 connectors are not beneath the ESD shield.
4. Replace the keyboard (see Section A).
5. Power up and reinitialize the MR-61, see page 11.
6. Test the MR-61 to see that it is repaired.
7. Power down the MR-61, and install the seven (7) screws that hold the lid to the base.
8. Clean the MR-61 by wiping it down with a slightly damp cloth before returning it to the customer.

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**Note:** Never put an older 4090031101 mainboard into an MR-61. This board is extremely sensitive to ESD static discharge. Note that the 4090031101 board is not used in the MR-76 either, as it has been replaced with the 4090035102 mainboard. If you have any 4090031101 mainboards in stock, please return them to ENSONIQ.

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<b>SECTION</b>
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<b>C</b>
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## Replacing the Power Supply Board (MR-61)

### Removing:

1. Remove any cables connected to the MR-61 including the power supply cable.
2. Turn the unit upside down on a tabletop and remove the seven (7) screws from the base of the MR-61 (see Section A).
3. Release the cable going to the power switch from the plastic retainer clip on the power supply cover.
4. Remove the three (3) screws that hold the power supply cover to the MR-61 base.
5. Remove the power supply cover by lifting it out of the unit.
6. Remove the 2-pin power switch connector from the power supply board.
7. Remove the 6-pin power cable from the power supply board.
8. Remove the four (4) screws (and the one washer from the grounding terminal) that hold the power supply board in place, then remove the power supply board from the unit.

### Installing:

1. Put the new power supply board in the base of the MR-61.
2. Reinstall the screws and grounding washer removed in step 8 above.
3. Replace the connectors removed in steps 6 and 7 above.
4. Replace the power supply cover. Be careful to place the rubber grommets correctly into the cutouts on the cover.
5. Replace the screws removed in step 4 above.
6. Press the cable going to the power switch back into the retainer clip on the power supply cover.
7. Power up and reinitialize the MR-61, see page 11.
8. Test the MR-61 to see that it is repaired.
9. Power down the MR-61, and install the seven (7) screws that hold the lid to the base.
10. Clean the MR-61 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
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<b>D</b>
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## Replacing the Jack/Analog Board (MR-61)

### Removing:

1. Remove any cables connected to the MR-61 including the power supply cable.
2. Turn the unit upside down on a tabletop and remove the seven (7) screws from the base of the MR-61 (see Section A).
3. Remove the four (4) screws from the jack area on the back of the MR-61.
4. Turn the unit right side up, and open the lid.
5. Remove the 30-pin cable from J7 on the jack/analog board.
6. Remove the jack/analog board.

### Installing:

1. Put the new board in place in the lid.
2. Replace the screws removed in step 3 above.
3. Replace the 30-pin cable removed in step 5 above.
4. Power up and reinitialize the MR-61, see page 11.
5. Test the MR-61 to see that it is repaired.
6. Power down the MR-61, and install the seven (7) screws that hold the lid to the base.
7. Clean the MR-61 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
<b>E</b>

## **Replacing the Keypad/Display Boards (MR-61)**

### **Removing:**

1. Remove any cables connected to the MR-61 including the power supply cable.
2. Turn the unit upside down on a tabletop and remove the seven (7) screws from the base of the MR-61 (see Section A).
3. Remove the 30-pin cable from J7 on the jack/analog board, and remove the jack/analog board (see Section D).
4. Turn the unit right-side up, and remove the Sound/Rhythm Type, Sound/Rhythm Name, and Mix knobs from the front panel.
5. Open the lid and remove the 30-pin cable from J25 on the mainboard.
6. Remove the fourteen (14) screws that secure the ESD shield to the lid.  
**Tip:** Using a felt-tip marker, put a dot on the ESD shield next to each screw. That way, you can return the screws to their original holes.
7. Remove the ESD shield.
8. Remove the remaining eleven (11) screws that hold the keypad/display boards to the lid.
9. Carefully lift the two keypad/display boards out of the lid.
10. Remove the plastic lens cover from the left keypad/display board.
11. Remove the 30-pin cable connecting the left and right keypad/display boards.
12. Remove the 34-pin ribbon cable from the J1 connector on the left keypad/display board.

### **Installing:**

1. Replace the 30-pin cable connecting the (new) left and right keypad/display boards.
2. Install the plastic lens cover onto the (new) left keypad/display board.
3. Connect the 34-pin ribbon cable to the J1 connector on the left keypad/display board.
4. Put the boards in place in the lid aligning them with the punched-out slots.
5. Replace the eleven (11) screws removed in step 8 above.
6. Reinstall the ESD shield removed in steps 6 and 7 above.
7. Replace the cable removed in step 5 above.
8. Replace the jack/analog board removed in step 3 above.
9. Replace the 30-pin cable to J7 on the jack/analog board.
10. Replace the three (3) knobs removed in step 4 above.
11. Power up and reinitialize the MR-61, see page 11.
12. Test the MR-61 to see that it is repaired.
13. Power down the MR-61, and install the seven (7) screws that hold the lid to the base.
14. Clean the MR-61 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
<b>F</b>

## Replacing the Wheels/Pressure Board (MR-61)

### Removing:

1. Remove any cables connected to the MR-61 including the power supply cable.
2. Turn the unit upside down on a tabletop, remove the seven (7) screws from the base of the MR-61, and remove the keyboard (see Section A).
3. Turn the unit right-side up, and remove the 6-wire cable from J1 and the 6-wire cable from J2 on the wheels/pressure board.
4. Remove the wheels/pressure board from the plastic standoffs by squeezing the retaining clips on the standoffs with needlenose pliers and gently lifting the board.

### Installing:

1. Snap the new wheels/pressure board onto the plastic standoffs.
2. Connect the cables removed in step 3 above.
3. Reinstall the keyboard (see Section A).
4. Open the lid, and connect the 2-pin cable to J2 on the wheels/pressure board. Tuck the excess cable beneath the keyboard to get it out of the way of the mod wheel.
5. Power up and reinitialize the MR-61, see page 11.
6. Test the MR-61 to see that it is repaired.
7. Power down the MR-61, and install the seven (7) screws that hold the lid to the base.
8. Clean the MR-61 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
<b>G</b>

## Replacing the Disk Drive (MR-61)

### Removing:

1. Remove any cables connected to the MR-61 including the power supply cable.
2. Turn the unit upside down on a tabletop, remove the seven (7) screws from the base of the MR-61 (see Section A).
3. Turn the unit right-side up, and open the lid.
4. Remove the two (2) screws securing the disk drive to the left side panel.
5. Remove the two (2) screws securing the mounting bracket to the lid, then remove the mounting bracket from the old disk drive.
6. Remove the 34-pin cable and the 3-wire cable from the disk drive assembly.
7. Remove the two (2) screws securing the mounting bracket to the disk drive.
8. Place the defective drive into the anti-static bag that the new drive came in.

### Installing:

1. Attach the mounting bracket to the new disk drive using the screws from step 7 above.
2. Connect the cables removed in step 6 above.
3. Install the disk drive assembly using the screws from steps 4 and 5 above.
4. Power up and reinitialize the MR-61, see page 11.
5. Test the MR-61 to see that it is repaired.
6. Power down the MR-61, and install the seven (7) screws that hold the lid to the base.
7. Clean the MR-61 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
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<b>H</b>
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## Replacing the Mainboard (MR-76)

### Removing:

1. Remove any cables connected to the MR-76 including the power supply cable.
2. Turn the unit upside down on a tabletop with the keys facing away from you. We recommend using a mat or some type of padding to protect the top of the MR-76.
3. Remove the five (5) screws from the jack panel, and remove all of the screws from the bottom plate of the MR-76. The six (6) screws securing the access panel and the feet do not need to be removed.
4. Remove the bottom plate from the MR-76.
5. Using a scribe, disconnect the following cables from the mainboard:
  - a) J25 - 30-pin ribbon cable to the left keypad/display board
  - b) J26 - 30-pin ribbon cable to the jack/analog board
  - c) J16 - 34-pin ribbon cable to the disk drive
  - d) J22 - 3-wire cable to the disk drive
  - e) J27 - 6-wire cable to the wheels/pressure board
  - f) J12 - 16-pin ribbon cable to the keyboard
  - g) J11 - 20-pin ribbon cable to the keyboard
  - h) J5 - 6-wire cable to the power supply board
6. Remove the four (4) screws at the top of the mainboard securing the board to the keyboard bracket.
7. Remove the mainboard from the three (3) plastic standoffs at the bottom of the board by squeezing the retaining clips on the standoffs with needlenose pliers and gently lifting the board.

### Installing:

1. Snap the new mainboard onto the plastic standoffs.
2. Replace the four (4) screws removed in step 6 above.
3. Reconnect all the cables removed in step 5 above.
4. Turn the unit right side up, power up and reinitialize the MR-76, see page 11.
5. Test the MR-76 to see that it is repaired.
6. Power down the MR-76, turn the unit over, and replace all of the screws in the bottom plate and rear panel.
7. Clean the MR-76 by wiping it down with a slightly damp cloth before returning it to the customer.



<b>SECTION</b>
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<b>I</b>
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## Replacing the Jack/Analog Board (MR-76)

### Removing:

1. Remove any cables connected to the MR-76 including the power supply cable.
2. Remove the bottom plate from the MR-76 (see Section H).
3. Using a scribe, remove the 30-pin ribbon cable from J7 on the jack/analog board.
4. Remove the four (4) screws from the jack area on the back of the MR-76.
5. Remove the jack/analog board.

### Installing:

1. Put the new jack/analog board in place in the MR-76.
2. Replace the screws removed in step 4 above.
3. Replace the 30-pin cable removed in step 3 above.
4. Turn the unit right side up, power up and reinitialize the MR-76, see page 11.
5. Test the MR-76 to see that it is repaired.
6. Power down the MR-76, turn the unit over, and replace all of the screws in the bottom plate and rear panel.
7. Clean the MR-76 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
<b>J</b>

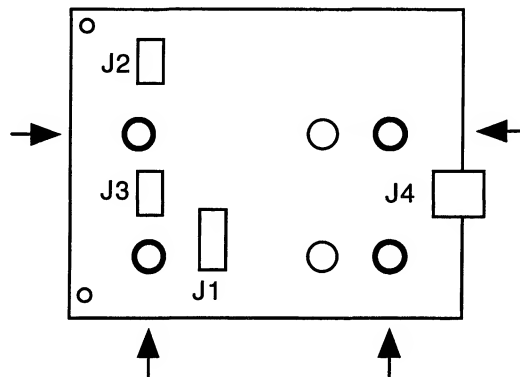
## Replacing the Wheels/Pressure Board (MR-76)

### Removing:

1. Remove any cables connected to the MR-76 including the power supply cable.
2. Remove the bottom plate from the MR-76 (see Section H).
3. Using a scribe, disconnect the following cables from the wheels/pressure board:
  - a) J1 - 6-wire cable to the modulation and pitch wheels
  - b) J2 - 2-wire cable to the white keys
  - c) J3 - 2-wire cable to the black keys
  - d) J4 - 6-wire cable to the mainboard
4. Remove the four (4) screws that hold the wheels/pressure board to the unit.
5. Slide the wheels/pressure board underneath the aluminum support bracket toward the disk drive.
6. Carefully remove the board from the black cable-retaining clip.
7. Remove the four (4) plastic standoffs left on the wheels/pressure board by applying pressure perpendicular to the standoff.

### Installing:

1. Press the four (4) standoffs into the holes in the new wheels/pressure board as shown in figure 19:



**Figure 19 - MR-76 Wheels/Pressure Board Standoff Locations**

2. With the wheels/pressure board beneath the support bracket, snap the black cable-retaining clip into the far left holes shown in figure 19 above.
3. Position the wheels/pressure board above the keyboard assembly, and replace the screws into the standoffs removed in step 4 above.
4. Connect the cables removed in step 3 above.
5. Tuck the 2-wire cables going to the keyboard into the black cable-retaining clip.
6. Turn the unit right side up, power up and reinitialize the MR-76, see page 11.
7. Test the MR-76 to see that it is repaired.
8. Power down the MR-76, turn the unit over, and replace all of the screws in the bottom plate and rear panel.
9. Clean the MR-76 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
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<b>K</b>
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## Replacing the Keyboard (MR-76)

### Removing:

1. Remove any cables connected to the MR-76 including the power supply cable.
2. Remove the bottom plate and the mainboard from the MR-76 (see Section H).
3. Remove the two (2) screws (with washers) from the right support bracket and slide the bracket out of the unit.
4. Remove the three (3) screws from the mainboard support bracket and remove the bracket.
5. Remove the six (6) screws from the left keyboard support bracket and remove the bracket.
6. Remove the wheels/pressure board (see Section J).
7. Remove the 16-pin and 20-pin cables from the keyboard assembly.
8. Remove the two (2) clear plastic edge-guard strips that secure the foil ESD shield to the keyboard assembly and gently bend the foil off of the keyboard assembly. The foil should remain in the unit.
9. Remove the five (5) screws with washers that hold the keyboard assembly into the MR-76 (found at the top of the keyboard).
10. Lift the front of the MR-76 slightly and slide the keyboard assembly out of the unit.

### Installing:

1. Turn the unit right-side up and slide the new keyboard (springs first) into the unit. Gently push the white keys down behind the front extrusion. Make sure the two 2-wire cables on the keyboard assembly are tucked inside the MR-76.
2. Carefully turn the unit upside-down, jack side closest to you, and replace the screws and washers removed in step 9 above.
3. Fold the ESD shield over the keyboard assembly edge and replace the two (2) edge guard strips that secure the shield to the keyboard assembly.
4. Replace the wheels/pressure board (see Section J).
5. Insert the right support bracket into the slot in the right side of the MR-76, replace the two (2) screws removed in step 3 above.
6. Replace the mainboard support bracket removed in step 4 above. Align the tab in the bracket with the hole in the bottom extrusion.
7. Replace the left keyboard support bracket. Make sure to slide the grounding cable terminal from the disk drive between the keyboard assembly and the bracket and attach with the screw removed in step 5 above.
8. Replace the mainboard (see Section H).
9. Replace the jack/analog board (see Section I).
10. Verify that all cables are connected.
11. Turn the unit right side up, power up and reinitialize the MR-76, see page 11.
12. Test the MR-76 to see that it is repaired.
13. Power down the MR-76, turn the unit over, and replace all of the screws in the bottom plate and rear panel.
14. Clean the MR-76 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
<b>L</b>

## Replacing the Keypad/Display Boards (MR-76)

### Removing:

1. Remove any cables connected to the MR-76 including the power supply cable.
2. Remove the Sound/Rhythm Type, Sound/Rhythm Name, and Mix knobs from the front panel.
3. Remove the bottom plate and mainboard from the MR-76 (see Section H).
4. Remove the jack/analog board (see Section I).
5. Remove the 6-wire cable from J1 and the 6-wire cable from J4 on the wheels/pressure board.
6. Remove the keyboard assembly and support brackets (see Section K).
7. Remove the twelve (12) screws securing the ESD shield.
8. Remove the cables from the retaining clamp on the left keypad/display board.
9. Remove the remaining eleven (11) screws holding the keypad/display boards into the MR-76.
10. Carefully lift the two keypad/display boards out of the unit.
11. Remove the plastic lens from the left keypad/display board.
12. Remove the 30-pin cable connecting the left and right keypad/display boards (J2 connectors).
13. Remove the 30-pin ribbon cable from the J1 connector on the left keypad/display board.

### Installing:

1. Replace the 30-pin J2 connector cable between the (new) left and right keypad/display boards.
2. Install the plastic lens cover onto the (new) left keypad/display board.
3. Connect the 30-pin ribbon cable to the J1 connector on the left keypad/display board.
4. Put the boards in place in the unit aligning them with the punched-out slots.
5. Replace the eleven (11) screws removed in step 9 above.
6. Replace the cables removed from the retaining clip in step 8 above.
7. Reinstall the ESD shield removed in step 7 above.
8. Replace the keyboard and support brackets (see Section K).
9. Replace the wheels/pressure board (see Section J).
10. Replace the mainboard (see Section H).
11. Replace the jack/analog board (see Section I).
12. Verify that all cables are connected.
11. Turn the unit right side up, power up and reinitialize the MR-76, see page XX.
12. Test the MR-76 to see that it is repaired.
13. Power down the MR-76, turn the unit over, and replace all of the screws in the bottom plate and rear panel.
14. Clean the MR-76 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
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<b>M</b>
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## Replacing the Disk Drive (MR-76)

### Removing:

1. Remove any cables connected to the MR-76 including the power supply cable.
2. Remove the bottom plate from the MR-76 (see Section H).
3. Remove the one (1) screw attaching the disk drive grounding wire to the middle support bracket.
4. Remove the four (4) screws securing the disk drive to the unit.
5. Remove the 34-pin cable and the 3-wire cable from the disk drive assembly.
6. Remove the grounding wire from the disk drive assembly.
7. Place the defective drive into the anti-static bag that the new drive came in.

### Installing:

1. Attach the grounding wire to the new disk drive.
2. Connect the cables removed in step 5 above.
3. Install the disk drive assembly into the MR-76 using the four (4) screws from steps 4 above.
4. Slide the grounding cable terminal between the keyboard assembly and the middle support bracket and attach with the screw removed in step 3 above.
5. Turn the unit right side up, power up and reinitialize the MR-76, see page 11.
6. Test the MR-76 to see that it is repaired.
7. Power down the MR-76, turn the unit over, and replace all of the screws in the bottom plate and rear panel.
8. Clean the MR-76 by wiping it down with a slightly damp cloth before returning it to the customer.

<b>SECTION</b>
<b>N</b>

## Replacing the Power Supply Board (MR-76)

### Removing:

1. Remove any cables connected to the MR-76 including the power supply cable.
2. Remove the bottom plate from the MR-76 (see Section H).
3. Remove the four (4) screws (and the one washer from the grounding terminal) that hold the power supply board in place, then lift the power supply board from the unit.
4. Remove the 2-wire connector going to the power switch from the power supply board.
5. Remove the 6-wire connector going to the mainboard from the power supply board.
6. Remove the power supply board from the unit.

### Installing:

1. Put the new power supply board in the MR-76.
2. Reinstall the screws and grounding washer removed in step 3 above.
3. Press the cable going to the power switch back into the retainer clip on the power supply board.
4. Press the cable going to the mainboard back into the retainer clip on the power supply board.
5. Turn the unit right side up, power up and reinitialize the MR-76, see page 11.
6. Test the MR-76 to see that it is repaired.
7. Power down the MR-76, turn the unit over, and replace all of the screws in the bottom plate and rear panel.
8. Clean the MR-76 by wiping it down with a slightly damp cloth before returning it to the customer.

**MR-61 MODULE PART NUMBERS**

<b>Jack/Analog Board</b>	<b>4090031201</b>
<b>Wheels/Pressure Board</b>	<b>4090031401</b>
<b>Left Keypad/Display Board</b>	<b>4090031501</b>
<b>Right Keypad/Display Board</b>	<b>4090031601</b>
<b>Mainboard</b>	<b>4090035101</b>
<b>Power Supply Board</b>	<b>6030000201</b>
<b>Test Expansion Board</b>	<b>4090033301</b>

**MR-76 MODULE PART NUMBERS**

<b>Jack/Analog Board</b>	<b>4090031201</b>
<b>Left Keypad/Display Board</b>	<b>4090032701</b>
<b>Right Keypad/Display Board</b>	<b>4090032801</b>
<b>Wheels/Pressure Board</b>	<b>4090033701</b>
<b>Mainboard</b>	<b>4090035102</b>
<b>Power Supply Board</b>	<b>6030000201</b>
<b>Test Expansion Board</b>	<b>4090033301</b>

